

CLAIMS

1. A data storage device for storing digital information in a readable form comprises one or more memory elements, each memory element
5 comprising a planar magnetic conduit capable of sustaining and propagating a magnetic domain wall formed into a continuous propagation track, wherein each continuous track is provided with at least one inversion node whereat the magnetisation direction of a domain wall propagating along the conduit under action of a suitable applied
10 field is changed, each inversion node comprising a portion in which a direction change away from the initial path and a subsequent direction change back to the initial path are provided in the conduit such that no direct propagation path is possible across the deviating portion.
- 15 2. A data storage device in accordance with claim 1 wherein each continuous track is provided with at least one inversion node whereat the magnetisation direction of a domain wall propagating along the conduit under action of a suitable applied field is substantially reversed.
- 20 3. A data storage device in accordance with claim 1 or claim 2 wherein each continuous track is provided with a large plurality of inversion nodes.
4. A data storage device in accordance with any preceding claim wherein a
25 conduit is formed into a closed loop to comprise a continuous propagation track.
5. A data storage device in accordance with any preceding claim wherein a conduit does not form an entire closed loop but a chain of inversion

ART 34 AMDT

nodes, and means are provided to transfer data between the two ends thereof so that data is still able to circulate around an apparently closed loop, the means comprising a data writing facility at one end of the chain and data reading facility at the other end of the chain, and additional
5 circuitry to feed the data back electronically from the output of the chain to the input of the chain.

6. A data storage device in accordance with any preceding claim wherein deviations comprise 90° deviations from the initial path of the conduit.
10
7. A data storage device in accordance with any preceding claim wherein deviations from the initial path occur gradually over a distance along the conduit track.
- 15 8. A data storage device in accordance with any preceding claim wherein the inversion node comprises a cycloidal portion within a conduit loop structure or a topological equivalent of such a structure.
- 20 9. A data storage device in accordance with claim 8 comprising a plurality of such cycloidal portions provided in each loop.
10. A data storage device in accordance with claim 9 comprising a number of magnetic conduits formed into closed loops each comprising a plurality of cycloids serving to effect abrupt directional reversals in a
25 magnetisation direction of a domain wall passing thereacross.
11. A data storage device in accordance with one of claims 8 to 10 wherein each cycloid has a turning radius which is in the range three to ten times the conduit width.

ART 34 AMDT

12. A data storage device in accordance with any preceding claim wherein the magnetic conduit comprises a particular generally planar magnetic wire on a suitable substrate.

5

13. A data storage device in accordance with claim 12 wherein the magnetic wire comprises a magnetic nanowire with a thickness of between 2 nm and 25 nm and a width of between 50 nm and 1 μm .

10

ART 34 AMDT

AMENDED SHEET